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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,218	08/22/2003	Manfred Engelhardt	GR 98 P 2661 D	1417
7590	01/28/2004		EXAMINER	
LERNER AND GREENBERG, P.A. POST OFFICE BOX 2480 HOLLYWOOD, FL 33022-2480			NGUYEN, DILINH P	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 01/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/646,218

Applicant(s)

ENGELHARDT, MANFRED

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Objections***

Claim 1 is objected to because of the following informalities:

In line 9 of claim 1, the limitation: "...wherein the surface..." should be changed to --wherein a surface--;

in line 15 of claim 1, the limitation: "...as far as a surface..." should be changed to --as far as the surface--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mu et al. (U.S. Pat. 5612254) in view of Taguchi et al. (U.S. Pat. 5308793).

Mu et al. disclose a semiconductor device (fig. 6) comprising:

forming a diffusion barrier layer 23 on a substrate 20 having at least a first insulating layer 22 with a first conductive structure 41 embedded therein;

forming a second insulating layer 50 on the diffusion barrier layer;

etching a contact hole into the second insulating layer above the first conductive structure, wherein a surface of the first conductive structure is covered with the diffusion barrier layer within the hole;

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opening the contact hole as far as the surface of the first conductive structure;  
and

forming in the contact hole a second conductive structure 61 conductively  
connected to the first conductive structure.

Mu et al. fail to disclose forming spacers on side walls of the contact hole.

Taguchi et al. disclose a semiconductor device comprising: forming spacers 45 (cover fig.) on side walls of the contact hole, the spacers acting as a barrier to diffusion of the material from a conductive structure 47 into an insulating layer 42; and forming the spacers with a material selected from the group consisting of SiN (column 9, line 20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mu et al. to achieve highly uniform filling of the through hole during the burial process and provide a semiconductor device with low resistance characteristics, as shown by Taguchi et al.

- Regarding claim 2, Taguchi et al. disclose forming the spacers of electrically conductive material.
- Regarding claim 3, Mu et al. disclose forming the first electrically conductive structure by applying the first insulating layer to the substrate; producing an opening with a bottom and side walls in the first insulating layer; depositing and structuring a first conductive barrier layer 40 for forming an electrically conductive first diffusion barrier structure covering the bottom and the side walls of the opening; and forming the first conductive structure by filling the opening with conductive material.

- Regarding claim 4, Mu et al. disclose depositing a second conductive barrier layer 60 after the contact hole has been opened as far as the surface of the first conductive structure; depositing a conductive layer; structuring the conductive layer and the second conductive barrier layer, and thereby forming the second conductive structure 61 and a second diffusion barrier structure 60 arranged underneath the second conductive structure.
- Regarding claim 5, Mu et al. disclose forming the conductive structure 61 with a material selected from the group consisting copper (column 6, line 56); forming the first diffusion barrier structure 40 and the second diffusion barrier structure 60 with a material selected from the group consisting of TiN (column 6, lines 26 and 50); and forming one of the diffusion barrier layer 23 with a material selected from the group consisting of (column 5, line 67).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

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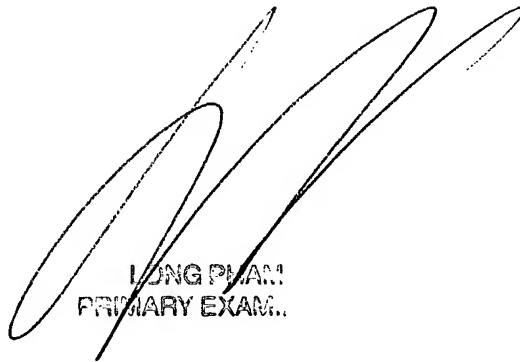
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN

January 22, 2004



LONG PHAM  
PRIMARY EXAM..